State of Louisiana
Coastal Protection and Restoration Authority

2018 Operations, Maintenance, and Monitoring Report

for

Bayou Chevee Shoreline Protection (PO-22)

State Project Number PO-22
Priority Project List 5

December 2018
Orleans Parish

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Table of Contents

I. Introduction....1

II. Maintenance Activity....3
a. Inspection Purpose and Procedures....3
b. Summary of Past Operations and Maintenance Projects....3
c. Inspection Results....3

III. Operation Activity....3
a. Operation Plan....3
b. Actual operations....4

IV. Monitoring Activity....4
a. Monitoring Goals....4
b. Monitoring Elements....4
c. Monitoring Results and Discussion....6
i. Shoreline Change....6
ii. Vegetation (SAV)....12

V. Conclusions....15
a. Project Effectiveness....15
b. Recommended Improvements....15
c. Lessons Learned....16

VI. References....17

VII. Appendices....18
Appendix A (Three Year Budget Projection)
Appendix B (Inspection Photographs)
Appendix C (Field Inspection Notes)
Appendix D (Monitoring Budget)

Preface

The Bayou Chevee Shoreline Protection (PO-22) project is funded through the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) with the United States Army Corps of Engineers (USACE) as the federal sponsor and the Coastal Protection and Restoration Authority of Louisiana (CPRA) as the state sponsor. This project was included on the 5th Priority Project List (PPL 5). This report includes monitoring data collected through August 2017, and Annual Maintenance Inspections through June 2018. The 2018 Operations, Maintenance, & Monitoring (OM&M) Report is the fifth in a series of reports. These reports, along with other documents and data pertaining to PO-22 can be accessed through CPRA's Coastal Information Management System (CIMS) website at http://cims.coastal.louisiana.gov/

I. Introduction

The Bayou Chevee Shoreline Protection project is located within the northern section of the Bayou Sauvage National Wildlife Refuge, approximately 10 miles northeast of New Orleans, Louisiana (Figure 1). The project area is located on the southern shoreline of Lake Pontchartrain and is divided into two areas, the north cove area and the south cove area. The North Cove project area, comprising 164 acres, is located just north and west of Bayou Chevee. It extends 300 ft into the marsh from the existing shoreline of a 110-acre pond of open-water and includes 54 acres of brackish marsh. The South Cove area, consisting of 48 acres, is located southeast of Bayou Chevee and northwest of Chef Menteur Pass. It extends 300 ft into the marsh from the existing shoreline around a 27-acre cove and includes 21 acres of brackish marsh. Project and reference area marshes are dominated by *Spartina patens* (marshhay cordgrass) with *Spartina alterniflora* (smooth cordgrass), *Pluchea spp.*, and *Cyperus spp*. present.

High wave and current energies associated with Lake Pontchartrain and Chef Menteur Pass have caused extensive shoreline erosion along the Lake Pontchartrain shoreline that has been estimated to average 15 ft/yr, or approximately 3.55 ac/yr from 1958-1983 (U.S. Army Corps of Engineers [USACE] 1997). Over the twenty year life of the project, the shoreline would be expected to erode 300 feet without project implementation. Shoreline erosion was not a measurable problem for the interior pond of the north cove prior to 1997 when the pond was separated from Lake Pontchartrain by a 250-ft strip of marsh. However, by early 1997 this marsh had disappeared leaving the interior shoreline exposed to the wave energies of Lake Pontchartrain.

The PO-22 project consists of approximately 8,875 linear feet of rock bankline protection along the shoreline of Lake Pontchartrain, extending north and south from Bayou Chevee. Construction was completed on December 12, 2001. The shore protection should create conditions that allow for the enclosed shallow water areas to be colonized by a greater abundance of submerged aquatic vegetation (SAV).

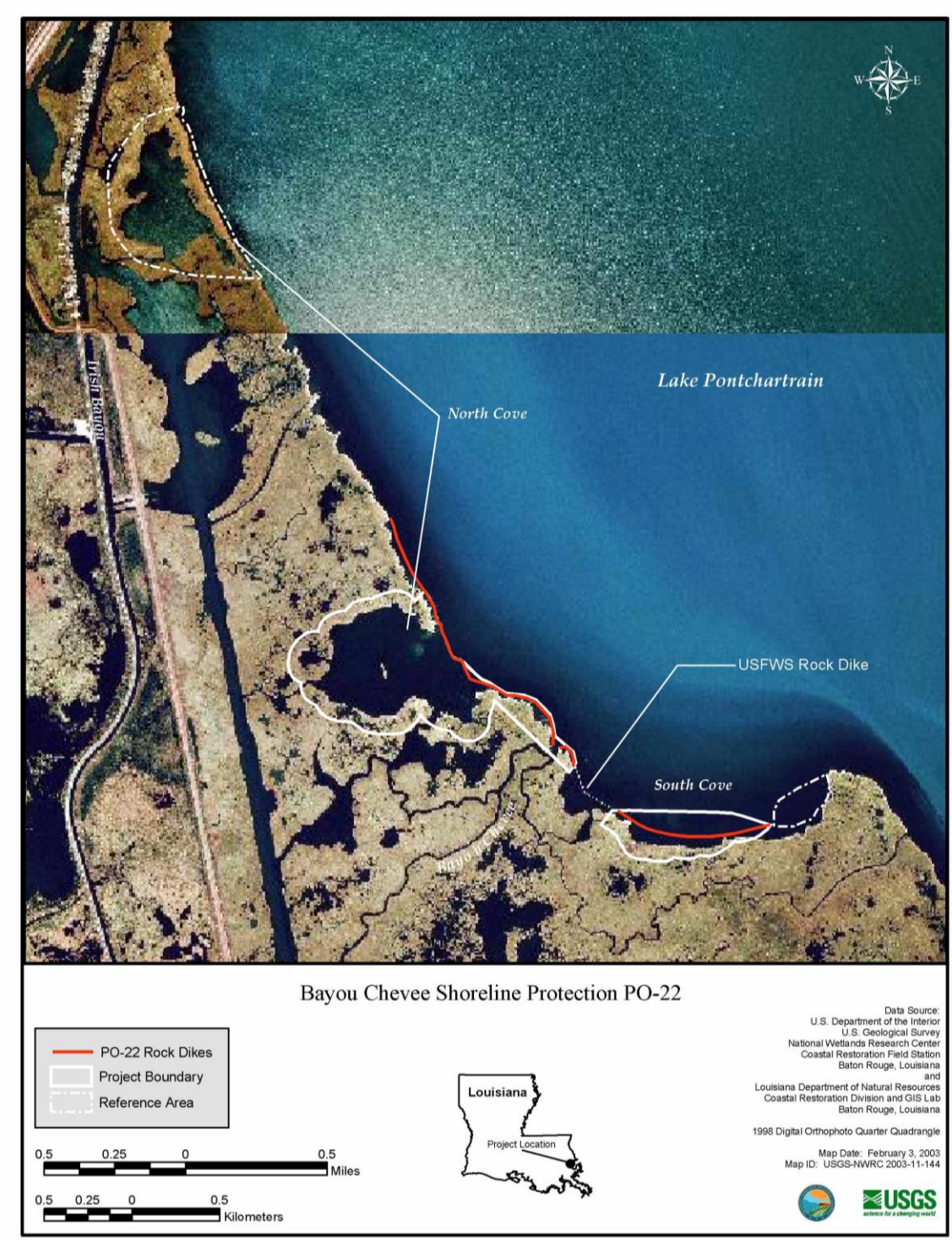

Figure 1. Bayou Chevee Shoreline Protection (PO-22) project location and features.

II. Maintenance Activity

a. Inspection Purpose and Procedures

The purpose of the inspection of PO-22 is to evaluate and document the condition of the constructed project features and recommended corrective maintenance actions, if needed. This is a visual inspection conducted from boat to determine if the rock dikes have settled to an elevation that is visibly close to an elevation of approximately 1.0 ft NAVD88. Should it be determined that corrective actions are needed, CPRA shall provide a detailed cost estimate for engineering, design, supervision, inspection, construction contingencies, and an assessment of the urgency of such repairs (LDNR 2004).

An inspection of the Bayou Chevee Shoreline Protection Project (PO-22) was held on June 6, 2018 (Richard 2018). Representatives in attendance included: Barry Richard, CPRA and Scott Wandell, USACE. At the time of the inspection the water level at the "Tally Ho" Hunting Club staff gauge was -0.15 feet NAVD88, based on Historical Online Data. A three (3) year (FY19-FY21) projected operation and maintenance budget is shown in Appendix A, and photographs from the inspection are included in Appendix B.

b. Summary of Past Operation and Maintenance Projects

Since completion of construction, there have been no maintenance events.

c. Inspection Results

Rock Rip Rap

A majority of the rock dikes have settled below the acceptable grade of 1.0 ft NAVD88. The rock structure has maintained its shape although some sections were beneath the water surface. No mud waves or loose geotextile were noticed. The settlement plates at each fish dip have corroded away and are no longer visible or functional.

III. Operation Activity

a. Operation Plan

There are no water control structures associated with this project; therefore a Structure Operation Plan was not required.

b. Actual Operations

There are no water control structures associated with this project; therefore, there are no required structure operations.

IV. Monitoring Activity

a. Monitoring Goals

The objective of the Bayou Chevee Shoreline Protection project is to provide shore protection for the north cove and south cove areas of the Bayou Sauvage National Wildlife Refuge and enhance the establishment of submerged aquatic vegetation in the south cove area while maintaining or enhancing their establishment in the north cove area.

The following goals will contribute to the evaluation of the above objective:

1. Decrease the mean rate of shoreline erosion in both the north and south cove areas.

2. Maintain (north cove) or maintain/increase (south cove) mean abundance of submerged aquatic vegetation in the ponds behind the rock dikes.

b. Monitoring Elements

The following monitoring elements provide the information necessary to evaluate the specific goals listed above:

Shoreline Change

To evaluate change in shoreline position, a sub-meter Differential Global Positioning Satellite (DGPS) system was used to document the position of the vegetated marsh edge. Shoreline position was documented as-built in early 2002; and post-construction in January 2005, May 2008, May 2011, September 2014, and August 2017. Shoreline position data were then analyzed using the Digital Shoreline Analysis System (DSAS version 4.0) extension for ArcGIS® (Thieler et al. 2009). DSAS uses a measurement baseline method to calculate rate-of-change statistics for a time series of shorelines. A baseline is constructed from which regularly spaced transects are cast. The transects intersect each shoreline at the measurement points used to calculate shoreline-change rates. Shoreline erosion rates for the project areas were compared to the shoreline erosion rates of the reference areas, and with historical rates of shoreline erosion collected by Gagliano et al. (1988). An additional survey will be conducted in 2020 post-construction for mapping shoreline change and movement over time.

Submerged Aquatic Vegetation (SAV)

The line-intercept method described in Nyman and Chabreck (1996) was used to determine the frequency of occurrence of SAV along two transects established in each of the north and south cove project and reference areas (Fig. 2). Transects in the North Cove area had 50 equally spaced sampling stations and transects in the South Cove area had 25 equally spaced sampling stations. Transects were traversed by airboat and at each sampling station

a garden rake was dragged along the bottom to collect any SAV present. The presence or absence of SAV was recorded at each station to determine frequency of occurrence. When SAV was present it was identified to species to determine frequency of individual species. SAV was sampled for pre-construction years 1998 and 2001, and in 2004, 2008, 2011, 2014, and 2017 post-construction. An additional survey will be conducted in year 2020.

Figure 2. Yellow lines indicate the location of submerged aquatic vegetation transects for the Bayou Chevee Shoreline Protection (PO-22) project.

c. Monitoring Results and Discussion

Shoreline Change

All areas have experienced some shoreline retreat since the previous survey in 2014. For the period of time from 2014 to 2017 the North Cove project area experienced an average rate of shoreline retreat of 3.9 ft/yr (Table 1) and an average net shoreline loss of 11.1 ft (Table 2). Similar to the trend observed in previous surveys, the majority of the shoreline retreat in the North Cove project area occurred on the north facing bank along the southeastern shoreline (Figure 3).

The North Cove reference area is divided into 2 sub-areas: 1.) an interior pond protected by a narrow strip of marsh from the wave action of Lake Pontchartrain, and 2.) a northeast-facing segment of Lake Pontchartrain shoreline (Figure 4). For the 2014 – 2017 time period the pond portion of the North Cove reference area experienced an average rate of shoreline retreat of 1.8 ft/yr (Table 1). The Lake Pontchartrain shoreline portion of the North Cove reference area experienced an average rate of shoreline retreat of 4.7 ft/yr (Table 1), and an average net shoreline loss of 13.5 ft (Table 2). The shoreline has retreated along the entire surveyed length of the Lake Pontchartrain shoreline at a fairly uniform rate. At some point between the 2008 and 2011 surveys, the narrow strip of marsh separating the interior pond from the lake breached at the southern end, just below southern extent of the surveyed area, creating a connection between the two. This breach does not appear to have expanded since then; however, there are several other locations north of the breach where the strip of marsh separating the interior pond from Lake Pontchartrain is approximately 40-ft wide and in danger of breaching in the near future (Figure 4).

Rates of shoreline retreat in the North Cove project area have been greater than the reference area's interior pond in all time periods since construction, and greater than the reference area's Lake Pontchartrain shoreline in 2 of the 5 periods since construction (Table 1). Much of the shoreline retreat in the North Cove project area is concentrated along the southeastern shoreline. One explanation for the greater rate in the project area is the large extent of the open water area behind the rock structure in the North Cove. The open water area is as much as 700 yds across measured north to south. It is likely that waves which are broken by the structure are able to re-form behind the structure and impact the shoreline. Another possibility is that the subsidence of the rock structure in the North Cove project area has reduced its effectiveness in reducing wave energy.

For the 2014 – 2017 time period, the South Cove project area experienced an average rate of shoreline retreat of 3.2 ft/yr (Table 1), and an average net shoreline loss of 9.1 ft (Table 2). The island created directly behind the rocks from the placement of spoil during construction remains intact, although it has decreased in size with each successive survey (Figure 5). Since construction, shoreline retreat along the eastern end of the South Cove project area has been greater than the western end. This phenomenon can be explained by the termination of the rock structure offshore rather than on land. Waves approaching from the northeast are not broken by the rocks and therefore are able to impact the shoreline behind the structure.

Table 1. Rate of shoreline change for north and south cove project and reference areas for 5 time periods of the PO-22 project. Rates shown are the average of all transects for the given area and time period. All values are ft/yr. Negative values indicate shoreline retreat.

Time Period	Area				
	North Cove Project	North Cove Reference	North Cove Reference - LP Shoreline	South Cove Project	South Cove Reference
2002 - 2005	-2.2	0.0	-0.3	-4.2	-34.7
2005 - 2008	-26.5	-1.6	-3.0	-74.9	-160.6
2008 - 2011	-6.2	-2.3	-6.7	-7.2	-31.2
2011 - 2014	-1.4	0.3	-3.9	-4.7	-10.2
2014 - 2017	-3.9	-1.8	-4.7	-3.2	-8.7
2002 - 2017	-8.1	-1.1	-3.7	-19.7	-54.2

Table 2. Net shoreline change for north and south cove project and reference areas for 5 time periods of the PO-22 project. Values shown are the average of all transects for the given area and time period. All values are in feet. Negative values indicate shoreline retreat.

Time Period	Area				
	North Cove Project	North Cove Reference	North Cove Reference - LP Shoreline	South Cove Project	South Cove Reference
2002 - 2005	-6.6	-0.1	-0.9	-12.7	-104.1
2005 - 2008	-89.2	-5.4	-10.1	-252.0	-540.2
2008 - 2011	-18.8	-6.9	-20.4	-21.8	-94.7
2011 - 2014	-4.8	1.0	-13.0	-15.5	-33.7
2014 - 2017	-11.1	-5.2	-13.5	-9.1	-24.9
2002 - 2017	-126.0	-16.6	-57.7	-306.9	-844.3

The South Cove reference area has experienced an average rate of shoreline retreat of 8.7 ft/yr (Table 1), and an average net shoreline loss of 24.9 ft (Table 2) for the time period from 2014 – 2017. Although these rates are the lowest of any of the 5 time periods since project construction in the South Cove reference area, this area continues to experience the highest rates of shoreline retreat of any of the areas surveyed. Although shoreline retreat has occurred along the entire length of South Cove reference area shoreline, much of the retreat has occurred along the eastern and western ends of the shoreline reach (Figure 5). The section of shoreline in the center of the South Cove reference area has retreated to the natural levee created by a bayou that parallels the shoreline here. The marsh in this area is likely more resilient and resistant to erosion than the surrounding marsh, thus accounting for the slightly lower rate of shoreline retreat here.

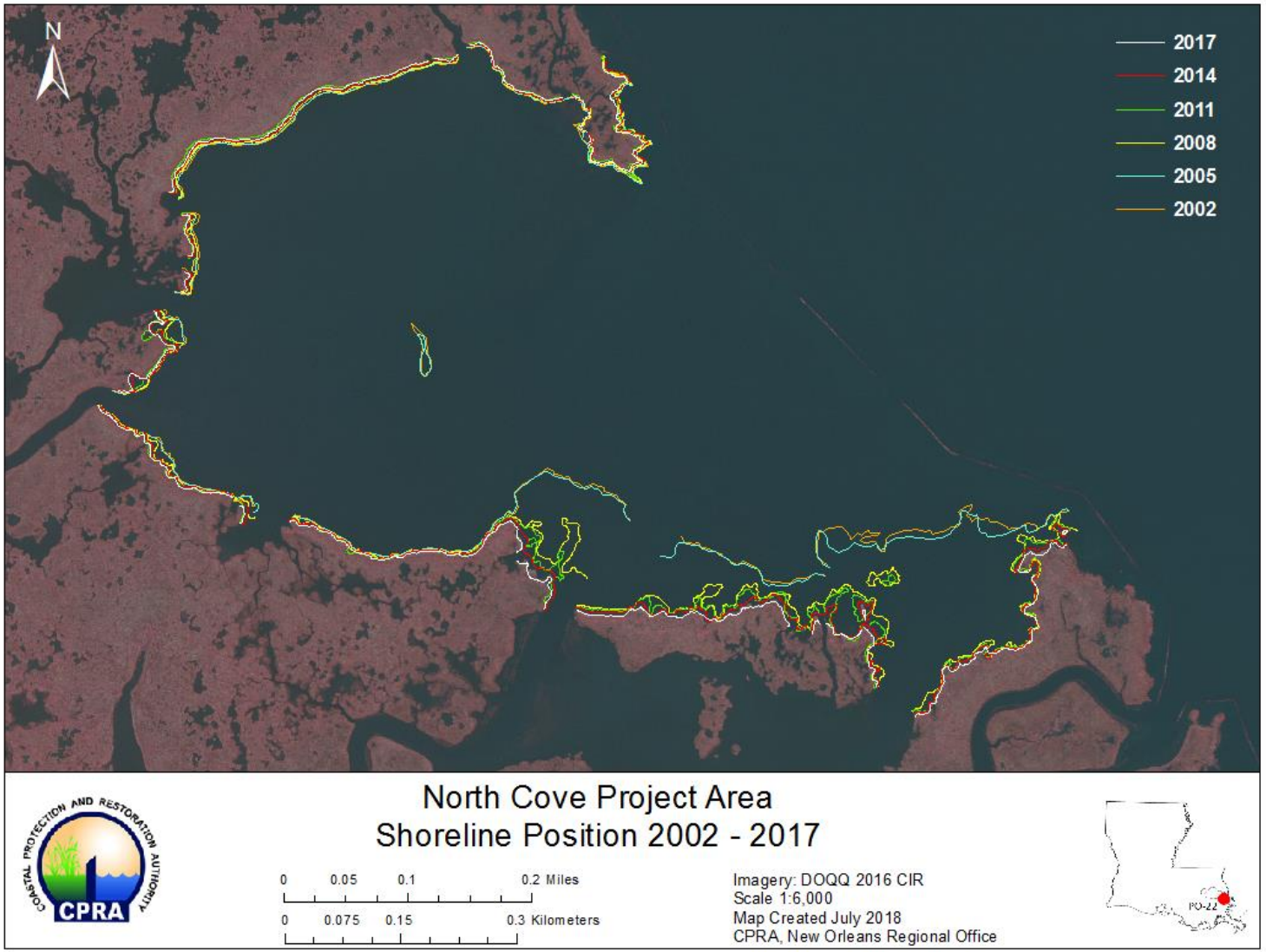

Figure 3. 2002, 2005, 2008, 2011, 2014 and 2017 shoreline position for the North Cove project area of the Bayou Chevee Shoreline Protection (PO-22) project.

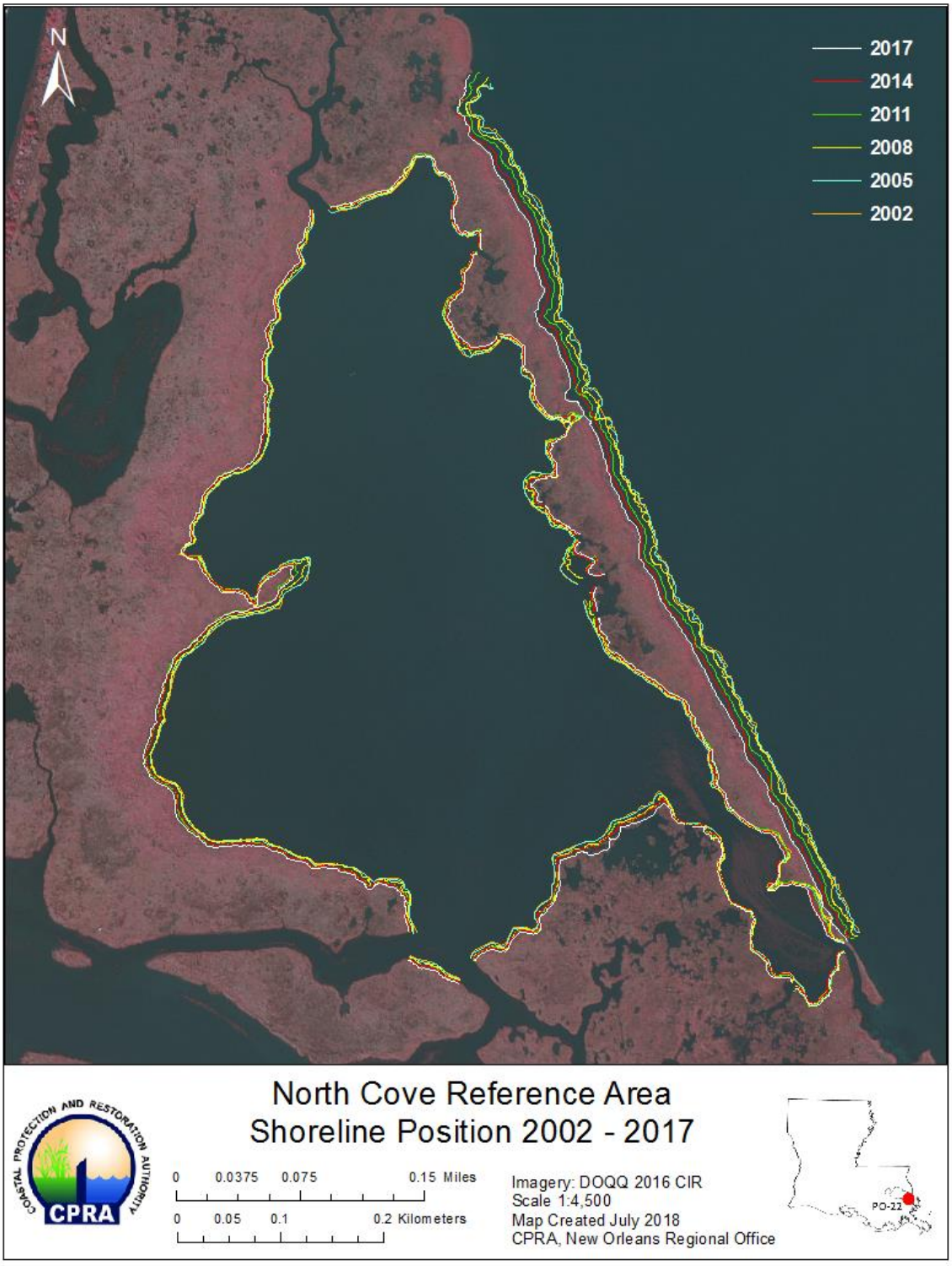

Figure 4. 2002, 2005, 2008, 2011, 2014, and 2017 shoreline position for the North Cove reference area of the Bayou Chevee Shoreline Protection (PO-22) project.

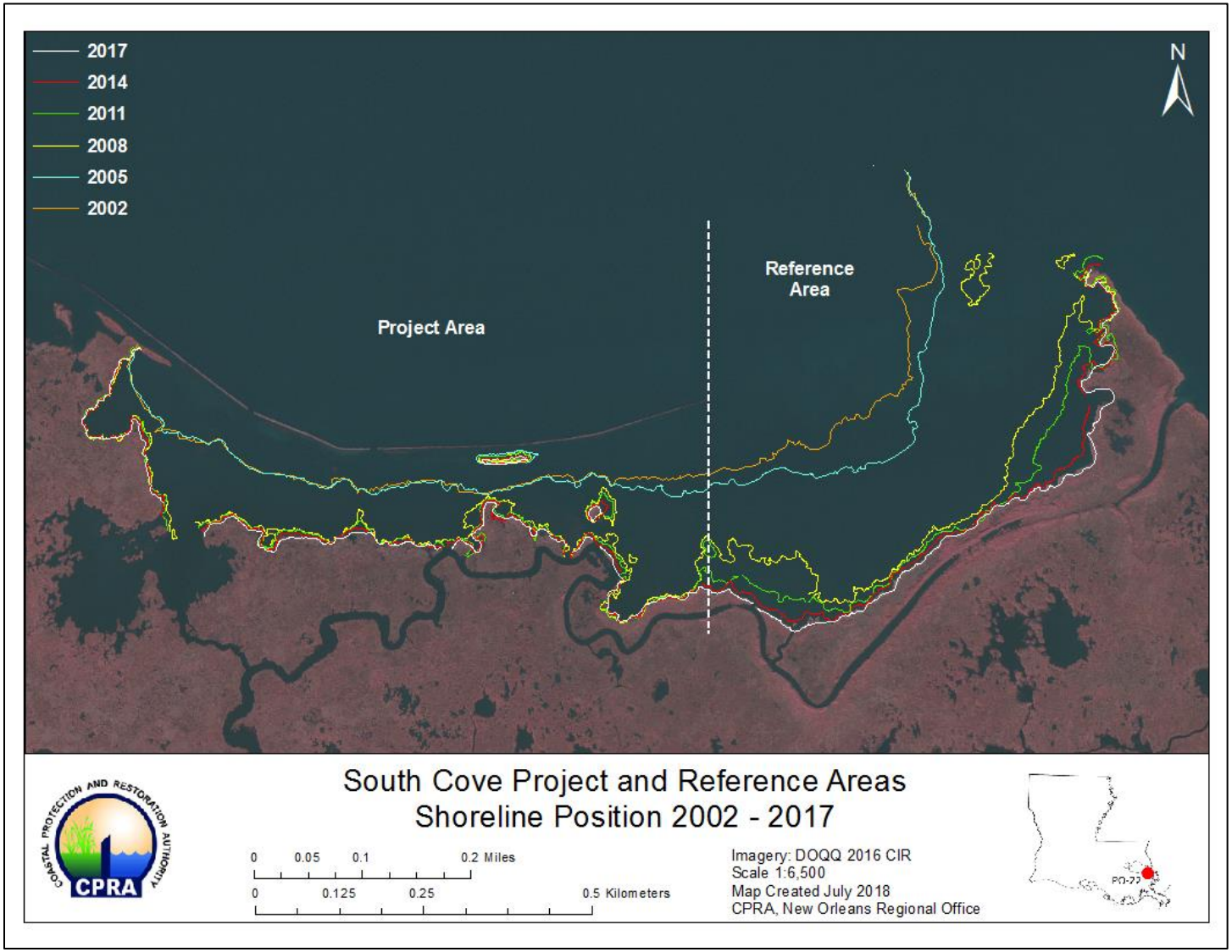

Figure 5. 2002, 2005, 2008, 2011, 2014, and 2017 shoreline positions for the South Cove project and reference areas of the Bayou Chevee Shoreline Protection (PO-22) project. The dashed line indicates the boundary between project and reference areas.

Vegetation (SAV)

The pre-construction surveys for overall SAV frequency for the North Cove showed inconsistent results. The project and reference areas showed very similar frequencies (96.8% and 100%, respectively) in the 1998 survey; however in 2001 SAV frequency in the project area had fallen to 6.2% versus 60.8% in the reference area (Figure 6). The post-construction surveys show higher SAV frequency in the project area in 2004 and 2011, with the 2008, 2014, and 2017 surveys showing higher frequency in the reference area. Post-construction surveys indicate greater similarity between project and reference areas. Mean SAV frequency was 79.8% in the project area and 80.2% in the reference area for the five post-construction surveys.

In the 2017 survey, coontail, *Ceratophyllum demersum,* was the dominant species in the North Cove project area (excluding filamentous algae; Figure 7, Table 3), as well as the reference area. Wigeongrass, *Ruppia maritima*, while present in both project and reference areas, was less abundant than previous years. Southern naiad, *Najas guadalupensis*, was present in both areas but much more abundant in the reference area than the project area. Similar to previous surveys eelgrass, *Vallisneria americana*, was observed in the project area but not the reference area. The relative frequency of eelgrass has increased in the 2 most recent surveys, and a large eelgrass bed was observed in the northeastern portion of the project area.

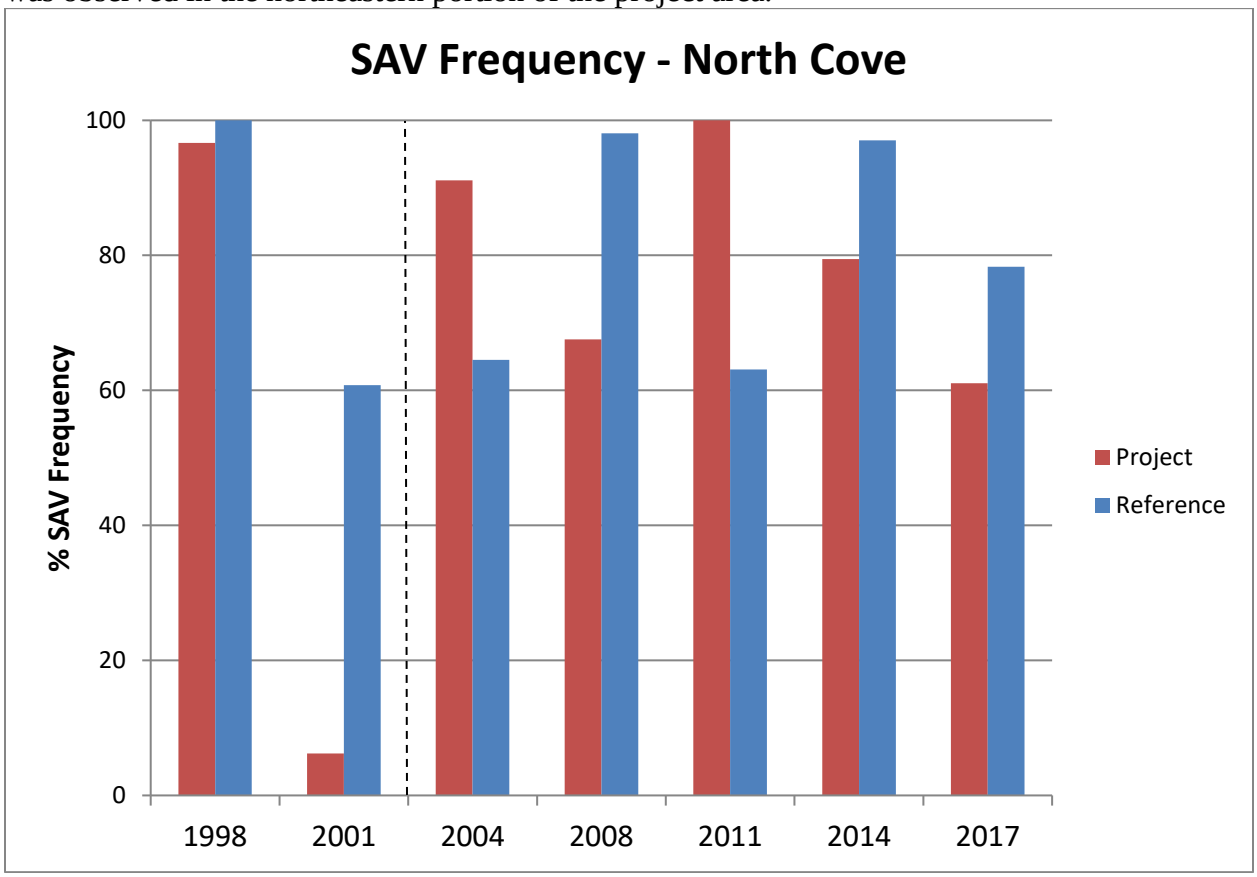

Figure 6. Frequency of occurrence of submerged aquatic vegetation (all species) in samples for North Cove project and reference areas for survey years 1998 – 2017 for the Bayou Chevee Shoreline Protection (PO-22) project. Dashed line indicates project construction.

Table 3. Relative frequency of submerged aquatic vegetation species for North Cove project and reference area during pre-construction years 1998 and 2001, and post-construction years 2004, 2008, 2011, 2014 and 2017 for the Bayou Chevee Shoreline Protection (PO-22) project. Values represent percentage of samples that contained a particular species. The symbol (.) denotes the species was not observed in that area.

Species	North Cove Project							North Cove Reference						
	1998	2001	2004	2008	2011	2014	2017	1998	2001	2004	2008	2011	2014	2017
Empty Sample	3.3	50.4	5.7	30.6	.	20.6	38.9	.	9.8	29.8	1.9	36.9	2.9	21.7
Algae	.	46.0	58.1	14.4	15.0	51.4	34.5	.	81.4	27.4	18.3	14.6	50.0	11.3
Ceratophyllum demersum	16.7	.	12.1	.	.	0.9	28.3	.	.	11.3	.	.	16.7	74.5
Myriophyllum spicatum	88.3	.	66.1	31.5	97.0	72.0	18.6	100.0	.	21.0	45.2	50.5	75.5	7.5
Najas guadalupensis	30.0	.	49.2	.	.	1.9	1.8	100.0	.	38.7	80.8	47.9	24.5	23.6
Potamogeton pusillus	.	.	.	56.8	.	.	.	.	.	.	26.9	.	.	.
Ruppia maritima	81.7	6.2	17.7	53.2	8.0	.	0.9	78.3	60.8	33.9	92.3	11.7	79.4	7.5
Vallisneria americana	46.7	.	.	3.6	3.0	15.9	23.9	.	.	.	.	.	.	.

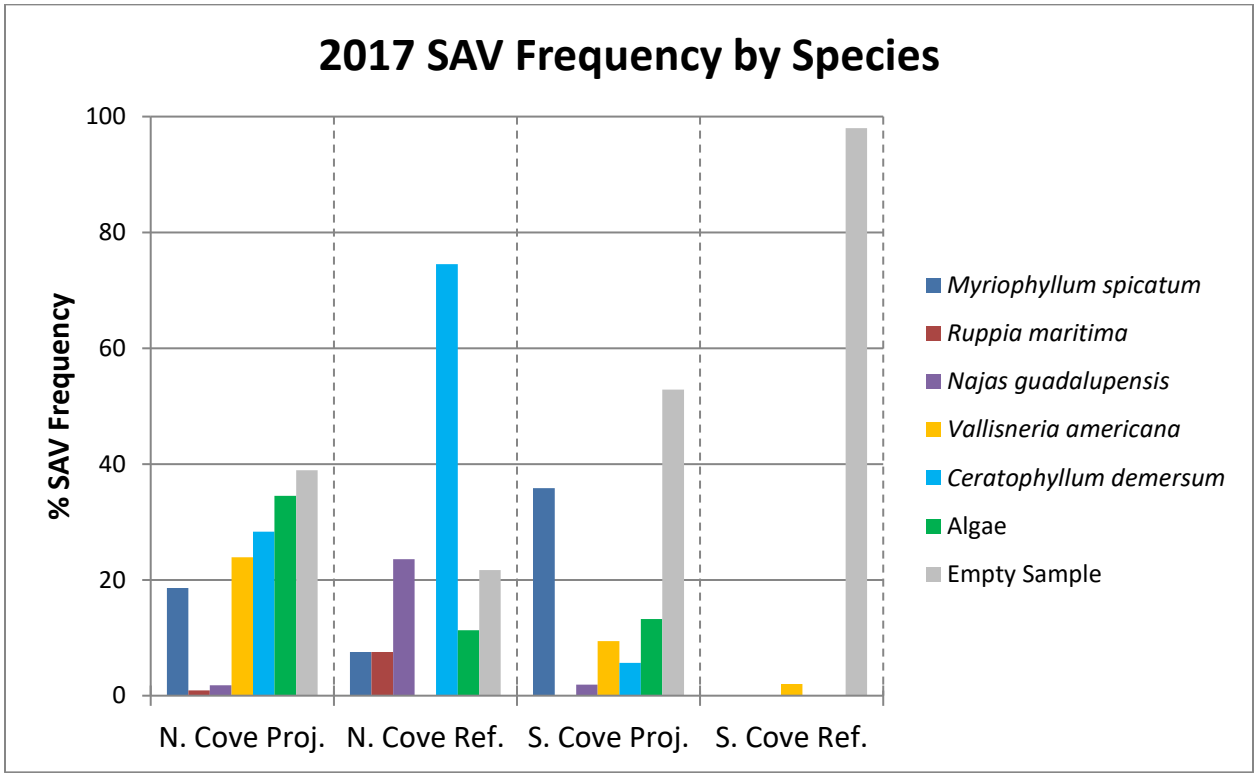

Figure 7. Frequency of occurrence of submerged aquatic vegetation in samples for North and South cove project and reference areas during the 2017 survey for Bayou Chevee Shoreline Protection (PO-22).

In the South Cove, both pre-construction surveys for overall SAV frequency of occurrence showed similar results for project and reference areas. In 1998, both areas had frequencies of 43.3%. In 2001, no SAV was measured in either area. However, post-construction surveys show consistently higher SAV frequency in the project area than in the reference area (Figure 8). Mean SAV frequency for the five post-construction surveys was 67.3% in the project area and 11.0% in the reference area.

SAV frequency decreased in the South Cove Project area, from 86.8% in 2014 to 47.2% in 2017 (Figure 8). Although SAV frequency decreased, species diversity increased (Figure 7, Table 4). Similar to previous surveys, *Myriophyllum spicatum* was the most frequently observed species. *Najas guadalupensis* and *Ceratophyllum demersum* were also present, and *Vallisneria americana* was observed for the first time since 1998. The South Cove reference area was mostly devoid of SAV; 98.0% of samples contained no SAV. *Vallisneria americana*, present in 2.0% of samples, was the only species observed in the area.

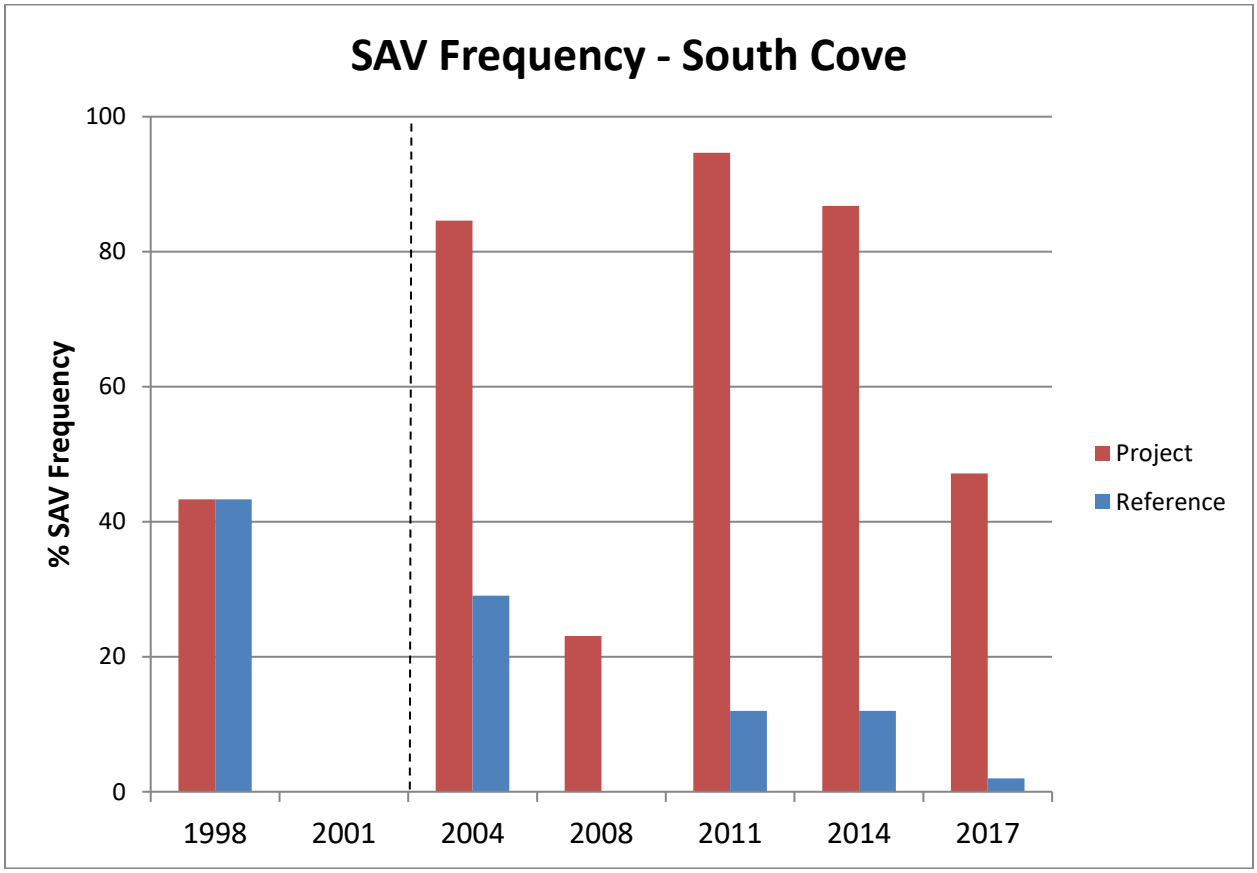

Figure 8. Frequency of occurrence of submerged aquatic vegetation (all species) in samples for South Cove project and reference areas for survey years 1998, 2001, 2004, 2008, 2011, 2014, and 2017 for the Bayou Chevee Shoreline Protection (PO-22) project. Dashed line indicates project construction.

Table 4. Relative frequency of submerged aquatic vegetation species for South Cove project and reference area during pre-construction years 1998 and 2001, and post-construction years 2004, 2008, 2011, 2014, and 2017 for the Bayou Chevee Shoreline Protection (PO-22) project. Values represent percentage of samples that contained a particular species. The symbol (.) denotes the species was not documented in that area.

Species	South Cove Project							South Cove Reference						
	1998	2001	2004	2008	2011	2014	2017	1998	2001	2004	2008	2011	2014	2017
Empty Sample	56.7	100.0	.	63.5	5.4	13.2	52.8	56.7	100.0	64.5	90.0	88.0	88.0	98.0
Algae	.	.	26.9	19.2	51.8	84.9	13.2	.	.	6.5	10.0	4.0	6.0	.
Ceratophyllum demersum	.	.	28.9	.	.	.	5.7	.	.	.	.	.	.	.
Myriophyllum spicatum	13.3	.	82.7	19.2	89.3	71.7	35.8	6.7	.	25.8	.	12.0	10.0	.
Najas guadalupensis	.	.	5.8	13.5	.	.	1.9	.	.	1.6	.	.	.	.
Ruppia maritima	.	.	21.2	11.5	1.8	.	.	13.3	.	4.8	.	2.0	.	.
Vallisneria americana	36.7	.	.	.	.	.	9.4	30.0	.	.	.	.	.	2.0

V. Conclusions

a. Project Effectiveness

For the most part, the project has been effective in achieving the goal of reducing the rate of shoreline erosion in the North and South Cove areas. However, as evidenced by the large amount of shoreline retreat between 2005 and 2008, the capacity of the rock structure to prevent erosion was overcome by the effects of Hurricane Katrina in 2005. For the period of time that included Hurricane Katrina (2005 – 2008), the rates of shoreline retreat in the North and South cove project areas were 4.3 and 10.4 times higher, respectively, than the next highest rates of retreat in any other time period.

The project has clearly been effective in achieving the goal of maintaining SAV abundance in the North Cove and maintaining/increasing abundance in the South Cove project areas. Frequency of occurrence of SAV in both the North Cove project and reference areas has been high since construction of the rock dike. In the South Cove, SAV frequency has been consistently higher behind the shoreline protection in the project area than in the reference area.

b. Recommended Improvements

The rock structure has settled significantly from the original constructed elevation. The inspection team discussed a maintenance rock lift, which would require a request for additional funds due to the insufficient amount of remaining Operations and Maintenance funds. The agreed upon course of action is for the project team to perform an existing condition survey, design a rock lift, request the necessary funding from CWPPRA, and perform the lift within the final three years of the project life (FY20-FY22). This would prove to be most beneficial for the future benefits of this project feature.

Additional shoreline protection is needed in order to reduce the high rate of shoreline retreat between the terminus of the rock structure and Chef Menteur Pass. Although this is outside the scope of PO-22, it will be addressed with a future CWPPRA project, St. Catherine Island Marsh Creation and Shoreline Protection (PO-179). This project was approved for Phase I funding under PPL 26 and is currently undergoing Engineering and Design.

c. Lessons Learned

This project shows how dynamic and vulnerable wetlands are. The high rate of shoreline retreat between 2005 and 2008 illustrates the destructive power of hurricanes. Efforts should be taken in the future to minimize construction delays. As a result of construction delays of the PO-22 project, the high rate of erosion along the south cove shoreline resulted in the rock structure terminating offshore rather than on land. Rock structures should terminate on land to prevent the "erosional shadow" created by having the rock structure end in open water. Heavy erosion along north facing shorelines shows the need to consider prevailing wind direction and wave angles in project design.

VI. References

Gagliano, S.M, D.W. Roberts, and R.J. Sauvage, Jr. 1988. Evaluation of the Wetlands of Eastern Orleans Parish, Louisiana. Baton Rouge, Louisiana: Coastal Environments, Inc. 53 pp.

Louisiana Department of Natural Resources (LDNR). 2004. Operation, Maintenance, Repair, Replacement and Rehabilitation Plan for the Bayou Chevee Shoreline Protection Project (PO-22). New Orleans, Louisiana: 6 pp. and appendices.

Nyman, J. A and R. H. Chabreck. 1996. Some Effects of 30 Years of Weir Management on Coastal Marsh Aquatic Vegetation - Implications to Waterfowl Management. Gulf of Mexico Science 1: 16-25.

Richard, B. 2018. 2018 Annual Inspection Report for Bayou Chevee Shoreline Protection (PO-22). Coastal Protection and Restoration Authority of Louisiana. 2 pp. and Appendices.

Thieler, E. R., Himmelstoss, E. A., Zichichi, J. L., and Ergul, Ayhan. 2009. Digital Shoreline Analysis System (DSAS) version 4.0 – An ArcGIS extension for calculating shoreline change: U.S. Geological Survey Open-File Report 2008-1278.

U.S. Army Corps of Engineers (USACE) 1997. Environmental Assessment (EA #261-A) CWPRRA Project XPO-69 Shore Protection at Bayou Chevee, Orleans Parish, Louisiana. New Orleans: U.S. Army Corps of Engineers. 13 pp.

Appendix A

3-Year O&M Budget Projection

Bayou Chevee Shoreline Protection Project (PO-22)																						
Federal Sponsor: USACE																						
Construction Completed : December 7, 2001																						
PPL 5																						
Current Approved O&M Budget	Year 0	Year - 1	Year -2	Year -3	Year -4	Year -5	Year -6	Year -7	Year -8	Year -9	Year -10	Year -11	Year -12	Year -13	Year -14	Year -15	Year -16	Year - 17	Year -18	Year -19	Project Life	Currently
June 2009	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Budget	Funded
State O&M	$0	$3,940	$0	$0	$4,255	$0	$206,911	$4,596	$0	$0	$0	$5,093	$0	$0	$0	$5,644	$0	$0	$0	$6,254	$236,693	$236,693
Corps Admin	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Federal S&A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total																					$236,693	$236,693
																					Remaining	Current 3 year
Projected O&M Expenditures																					Project Life	Request
Maintenance Inspection		$3,940			$4,255			$4,596				$5,093		$5,361		$10,000	$10,000			$6,254	$26,254	$10,000
General Maintenance																					$0	$0
Surveys																					$0	$0
Sign Replacement																					$0	$0
Federal S&A																					$0	$0
Maintenance/Rehabilitation																					$0	$0
E&D																	$47,405	$69,000			$116,405	$116,405
Construction																		$2,910,110			$2,910,110	$2,910,110
Construction Oversight																		$174,607			$174,607	$174,607
Total					$4,255	$0	$0	$4,596	$0	$0	$0	$5,093	$0	$5,361	$0	$10,000	$57,405	$3,153,717	$0	$6,254	$3,227,376	$3,211,122
O&M Expenditures from COE Report				$33,558				Current O&M Budget less COE Admin					$236,693				Current Project Life Budget less COE Admin					$236,693
State O&M Expenditures not submitted for in-kind credit				$0				Remaining Available O&M Budget					$203,135				Total Projected Project Life Budget					$3,260,934
Federal Sponsor MIPRs (if applicable)				$0				**Incremental Funding Request Amount FY117-FY19**					**$3,007,987**				**Project Life Budget Request Amount**					**$3,024,241**
Total Estimated O&M Expenditures (as of April 2010)				$33,558																		

Appendix B

Annual Inspection Photographs

Photo #1 – Terminus of Southern Reach.

Photo #2 – Southern Reach.

Photo #3 –Fish Dip.

Photo #4 – Northern Reach.

Appendix C

2018 Field Inspection Notes

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: **PO-22 Bayou Chevee Shoreline Protection** Date of Inspection: 6/6/18 Time: 9:30 am

Structure No. no number assigned Inspector(s): Richard, Wandell

Structure Description: Foreshore Rock Dike Water Level Inside: -0.15' Outside: -0.15'

Type of Inspection: Bi-Annual Weather Conditions: Clear, light wind

Item	Condition	Pysical Damage	Corrosion	Photo #	Observations and Remarks
Foreshore Rock Dike North Cove	Fair	Settling	N/A	3	North end looking good. South end settling below acceptable grade.
Foreshore Rock Dike South Cove	Poor	Settling	N/A	1, 2	Settling below acceptable grade.
USFWS Dike Segment	Poor	Settling	N/A		Settled below acceptable grade.
Settlement Plates	Poor	Heavy Corrosion	Heavy		Some plates have corroded through and are no longer visible. The rest are leaning too far out of plumb to give acurate data.
					Remarks: Project needs maintenance lift.

Appendix D

Monitoring Budget

Bayou Chevee Shoreline Protection (PO-22) - USACE - Priority List 5																									
Infl. Rate	2.60%							NO CRMS CHANGES																	
Price Level	1998	**Round Trip Mileage**	200																						
		Monitoring Budget	$ 144,178																						
	Year	**Prior**	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Daily Rate Items	**Rates**																								
Base Field Equipment	160.90		2	2			3			3			3			3			3			3				
Surveying	1,500.00			2			2			2			2			2			2			2				
14' Airboat	183.38		2	2			3			3			3			3			3			3				
Two Man Crew	395.06		2																						
Three Man Crew	592.59			2			3			3			3			3			3			3				
2 Man Lodging	100.00		1																						
2 Man Per Diem	48.00		2																						
Vehicle (per mile)	0.29		200	400			400			400			400			400			400			400				
SAV (per trip)	686.74		1				1			1			1			1			1			1				
Annual Rate Items																									
Misc. Supplies	200.00		1	1			1			1			1			1			1			1				
Computer Database	$ *566.00*		1	1			1			1			1			1			1			1				
Monitoring Progress Report	1,473.75				1																				
Comprehensive Monitoring Report	4,138.73							1			1			1			1			1				1		
TAG Meetings	1,611.46							1			1			1			1			1				1		
Quality Assurance	200.00		1	1	1		1	1		1	1		1	1		1	1		1	1		1		1		
Habitat Mapping	$ *8,559.41*																								
Monitoring Plan Dev.	9,879.00		1																						

Bayou Chevee Shoreline Protection (PO-22) - USACE - Priority List 5																									
	Year	**Prior**	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Daily Rate Items	**Rates**																								
Base Field Equipment	160.90		321.80	330.16			534.89			577.70			623.95			673.89			727.83			786.09				
Surveying	1,500.00			3,078.00			3,324.38			3,590.48			3,877.88			4,188.29			4,523.55			4,885.64				
14' Airboat	183.38		366.77	376.30			609.64			658.44			711.14			768.07			829.55			895.95				
Two Man Crew	395.06		790.12																						
Three Man Crew	592.59			1,216.00			1,970.00			2,127.69			2,298.00			2,481.95			2,680.62			2,895.19				
2 Man Lodging	100.00		100.00																						
2 Man Per Diem	48.00		96.00																						
Vehicle (per mile)	0.29		57.00	116.96			126.33			136.44			147.36			159.16			171.89			185.65				
SAV (per trip)	686.74		686.74				760.99			821.91			887.70			958.76			1,035.50			1,118.39				
Annual Rate Items																									
Misc. Supplies	200.00		200.00	205.20			221.63			239.37			258.53			279.22			301.57			325.71				
Computer Database	566.00		566.00	580.72			627.20			677.40			731.63			790.19			853.44			921.76				
Monitoring Progress Report	1,473.75				1,551.38																				
Comprehensive Monitoring Report	4,138.73							4,705.49			4,573.92			4,940.05			5,335.48			5,954.64				6,740.40		
TAG Meetings	1,611.46							1,832.13			1,978.79			2,137.18			2,308.25			2,493.02				2,762.58		
Quality Assurance	200.00		200.00	205.20	210.54		221.63	227.39		239.37	245.59		258.53	265.25		279.22	286.48		301.57	309.41		325.71		342.87		
Habitat Mapping	8,559.41	8,559.00																							
Monitoring Plan Dev.	9,879.00		9,879.00																						
Wave Height Measurements	-																								
DNR Expenditures To Date		5,438.75																							
***Other Federal Expenditures**																									
Total		13,997.75	13,263.43	6,108.55	1,761.92	0.00	8,396.68	6,765.00	0.00	9,068.80	6,798.30	0.00	9,794.72	7,342.47	0.00	10,578.74	7,930.21	0.00	11,425.52	8,757.07	0.00	12,340.08	0.00	9,845.85	0.00	-
Projected - Running Total		13,997.75	27,261.18	33,369.73	35,131.65	35,131.65	43,528.33	50,293.33	50,293.33	59,362.13	66,160.43	66,160.43	75,955.14	83,297.62	83,297.62	93,876.36	101,806.56	101,806.56	113,232.08	121,989.15	121,989.15	134,329.24	134,329.24	144,175.08	144,175.08	144,175.08
Projected Grand Total		144,175.08																							